

AES Retirement Resource Adequacy Analysis Update

Status Conference Update | June 21, 2021

Docket 2021-0024



T E L O S E N E R G Y

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Stochastic Analysis of Resource Adequacy



- Addresses inter-annual resource variability by using multiple years of solar data in each analysis applied to any future grid
- Generator outages includes planned maintenance plus random maintenance and forced outages based on historical rates
- Capacity shortage for any grid architecture based on hundreds to thousands of years of across possible operation.
- Methodology inherently includes “bad” solar/wind days and even “bad” solar/wind months (see 2006 in chart to right)
- In addition to outage probability, the methodology allows detailed characterization (size and duration) of loss of load events

Loss of Load Hours by Sample with Stage 1 Deployed
(512 Monte Carlo Simulations)

← Outage Draws →

Solar Year	1	2	3	4	5	6	7	8	9	10	11	12
1998	0	0	10	3	0	0	2	0	3	6	0	0
1999	2	0	9	0	3	0	0	0	0	0	3	0
2000	0	0	0	0	0	0	0	2	0	0	6	0
2001	0	0	0	2	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	6	0	0	0	0
2003	0	0	1	0	0	0	0	0	0	0	0	1
2004	0	2	0	0	0	1	0	0	0	0	0	0
2005	0	0	0	4	0	0	0	1	0	0	0	0
2006	0	0	0	0	0	0	0	0	0	0	3	0
2007	0	3	0	0	0	2	0	0	0	0	0	0
2008	3	0	0	0	0	0	0	5	0	0	0	0
2009	0	0	2	0	1	0	0	1	0	0	3	0
2010	0	0	0	0	0	0	0	0	0	0	0	0
2011	11	0	2	0	0	0	0	0	1	0	3	0
2012	0	3	0	0	0	0	0	0	0	0	0	0
2013	2	0	3	3	0	2	0	0	0	0	0	7
2014	0	0	10	0	0	0	0	0	0	0	0	0
2015	1	0	0	0	3	0	8	0	0	0	0	0
2016	0	1	0	2	0	0	0	0	1	0	0	0
2017	0	0	0	0	0	0	1	1	0	0	0	0
2018	0	10	0	0	0	0	0	0	0	0	0	1

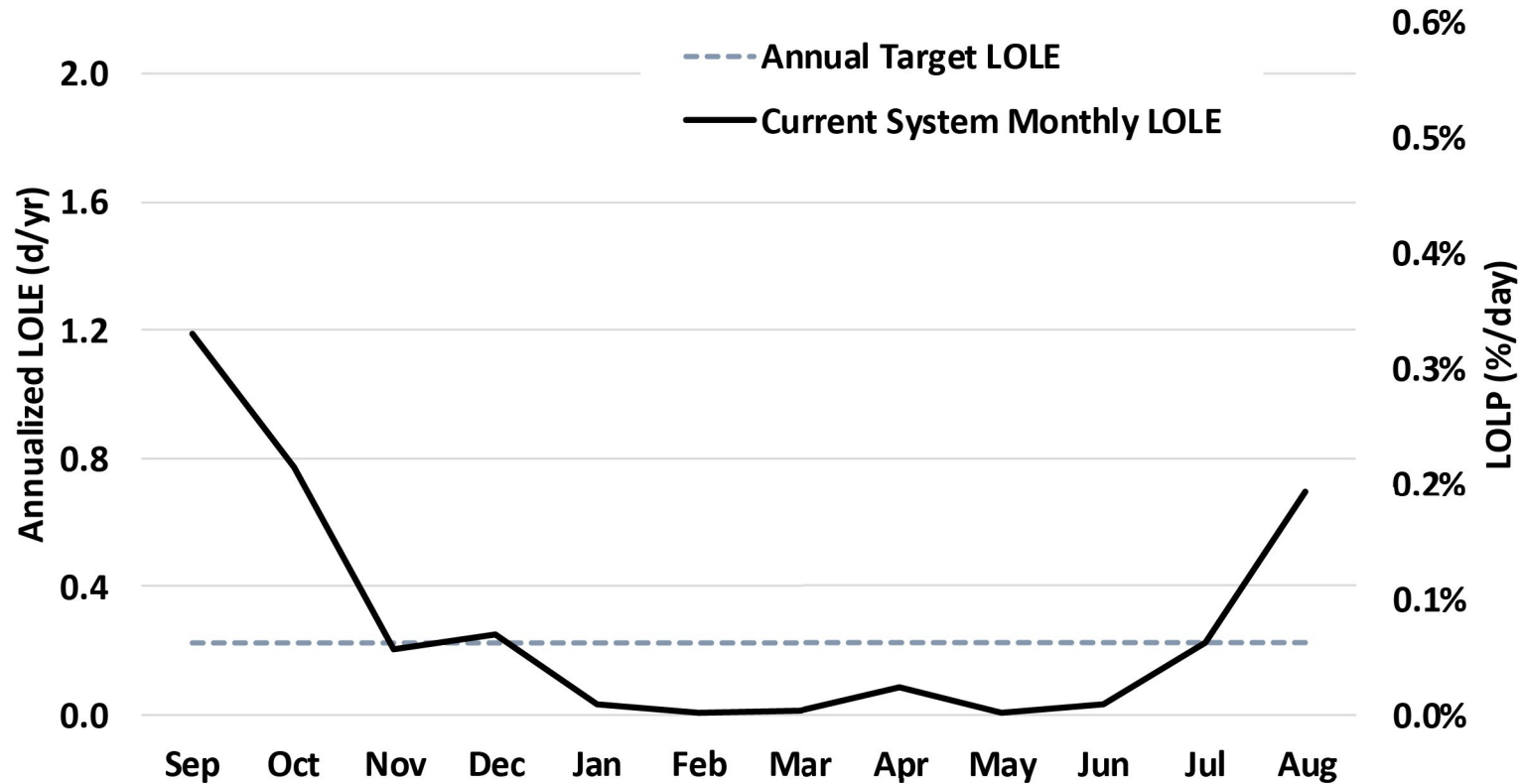
↑ Solar Years ↓

Average of outages over all years and outage draws used to characterize annual outage probability

Stage 1 + Stage 2 Schedule Updates

Project Name	Capacity	April Briefing	Current Docket
Kapolei BESS	185	9/1/2022	10/6/2022
			12/27/2022
AES West Oahu	13	9/7/2022	9/7/2022
Mililani I	39	11/1/2022	11/1/2022
Waiawa	36	12/1/2022	12/1/2022
Kupehau	60	5/1/2023	7/1/2023
Mountain View	7	5/17/2023	5/17/2023
Hoozana	52	8/31/2023	8/31/2023
Waiawa Phase 2	32	10/30/2023	10/30/2023
Barbers Point	15	12/29/2023	???
Mahi Solar	120	12/31/2023	9/30/2023

Current System with AES: Reliability Risk is not Uniform Across the Year.



Risk of LOLE is generally very low from January through June

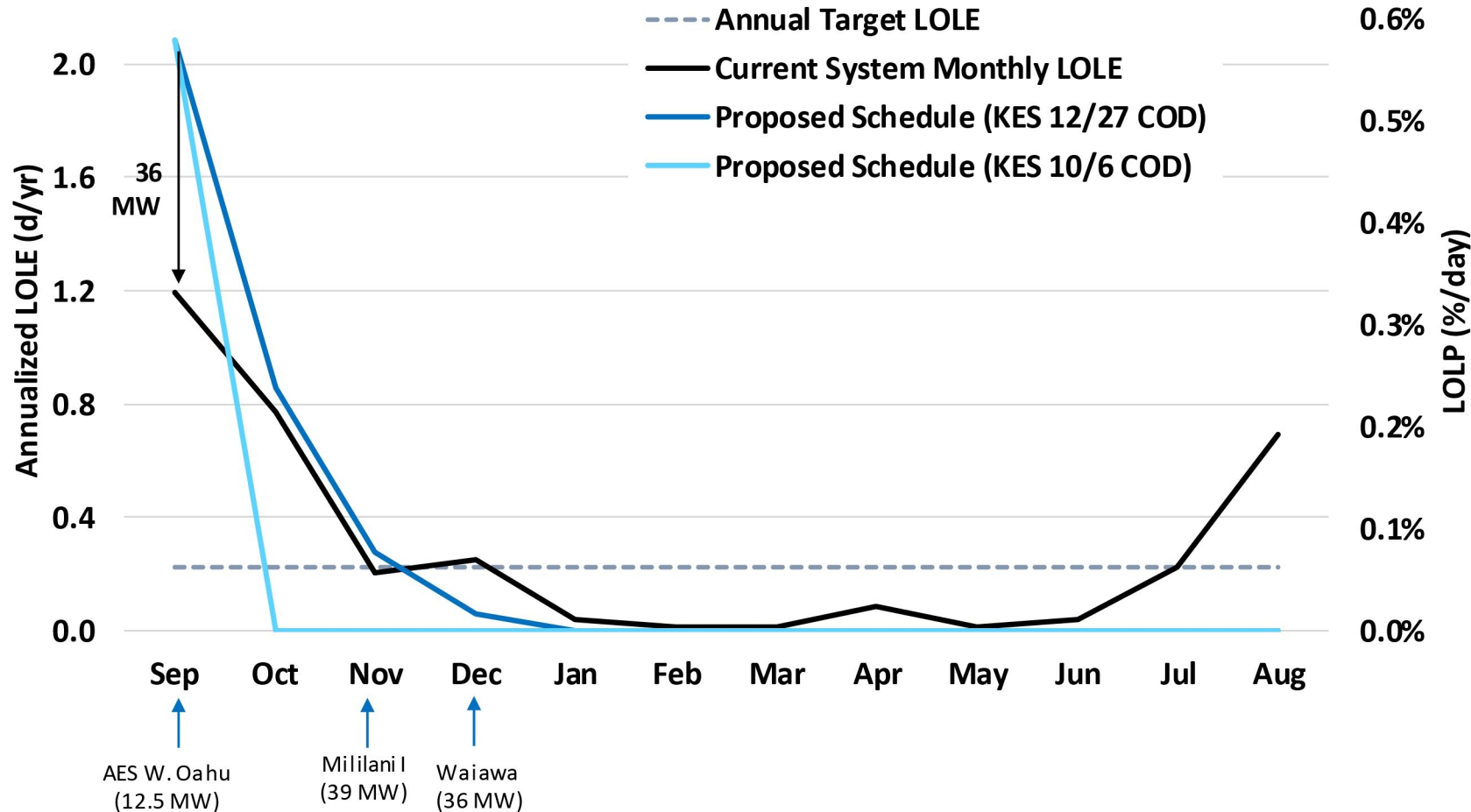
75% of LOLE risk occurs from August to October

33% of LOLE risk occurs during September

Annualized LOLE of 1.2 d/yr for September is equivalent to approximately one outage every 10 Septembers

Monthly resource adequacy risk (proposed schedules)

Proposed schedules show increased risk during September, normal risk during October/November, low risk afterwards



Assumes limited planned maintenance between September – November, 2022

Increased risk in September can be fully mitigated by an additional 36 MW of PV+storage, storage alone, demand response, or alternative generation by Sept 1

“Typical” outage most likely to be less than 30MW for one hour.

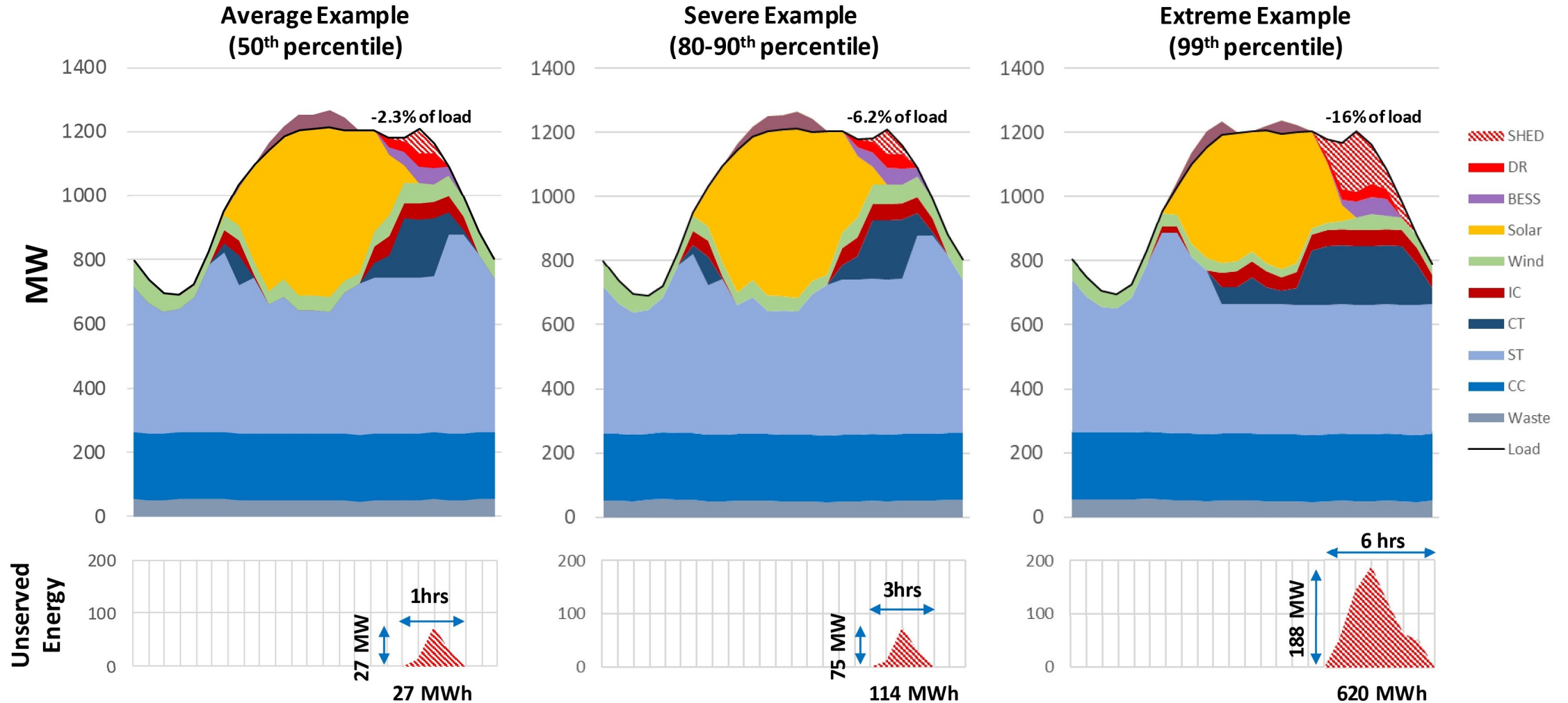
**** Acceleration of Mililani I or Waiawa to before September 1 returns system to current level of risk**

Probabilistic risk of an event in September increases from once every 10 years to once every 6 years but returns to current risk levels by October

What does 'typical' shortfall look like ?

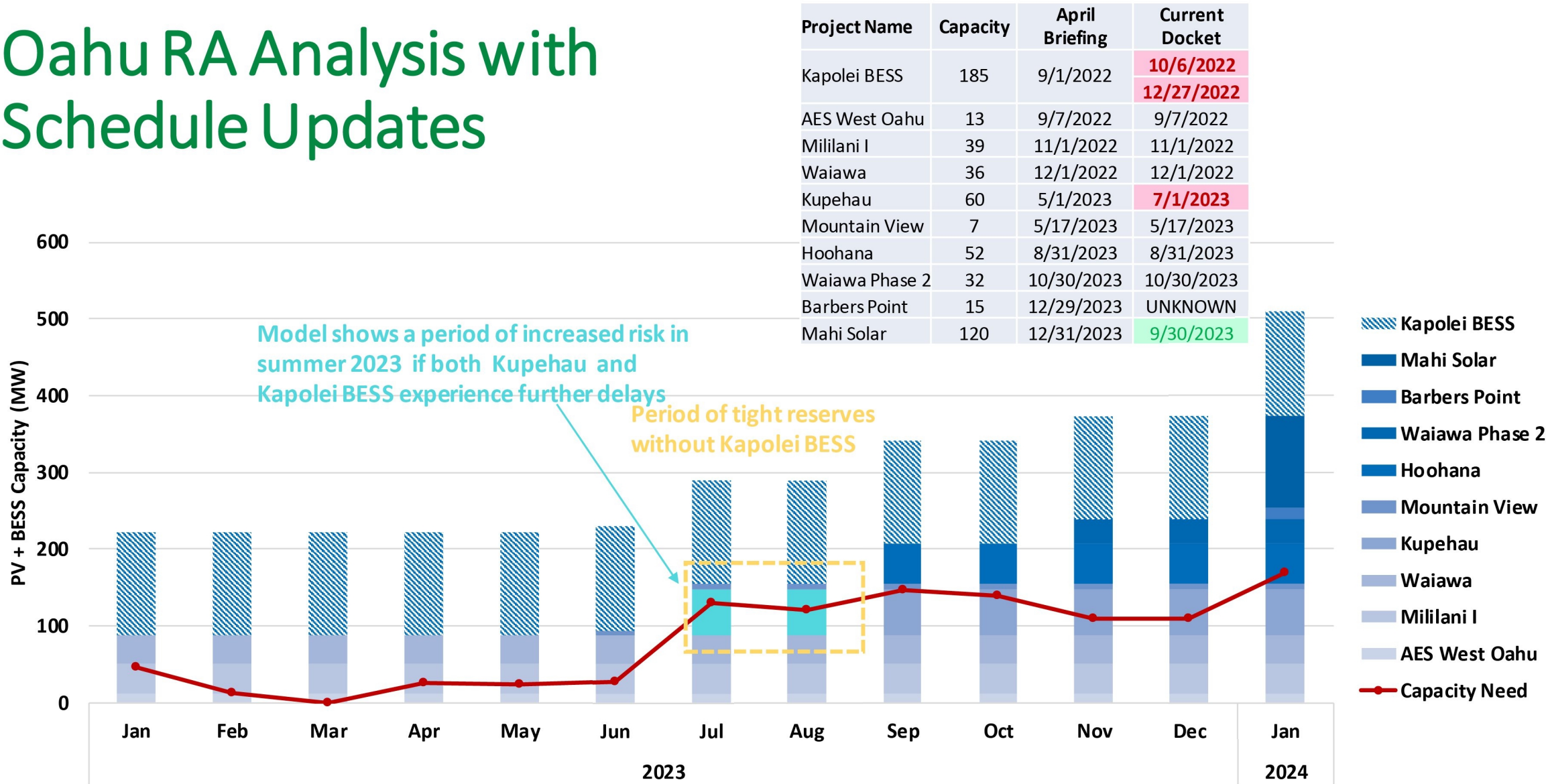
Based on modeled grid reliability Sept 2022 – Aug 2023.

AES Retired, no KES, 50 MW PV+BESS



Probability of an extreme event in any given month, is extremely low

Oahu RA Analysis with Schedule Updates



Capacity need is based on meeting either the current system reliability level or annual target, whichever is higher
*Results from March 16th briefing updated using larger sample size (N = 1008)

Summary

- Without mitigation, retirement of AES increases risk of an outage in September from once every 10 “Septembers” to once every 6 “Septembers”.
- Any delay in AES West Oahu will increase the September risk to once every 5 Septembers
- Accelerating any project of ~40MW or more to be online before Sept 1 (in addition to AES solar), will return risk to that of current system.
- Proposed solar or Kapolei BESS would provide sufficient reserves from Nov ‘22 through Jun ‘23.
- If Kapolei BESS is delayed until Summer ‘23 the schedule for Stage 1 and Stage 2 becomes more critical.
- Proposed earlier GCOD for Mahi solar important if Kapolei BESS is delayed thru 2023 but is not critical for reliability if BESS is online.
- Preliminary analysis (not shown) indicates full deployment of Stage 1, 2 and KES BESS would allow for reliable retirement of Waiau 3, 4, 5 & 6

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